

中国涡虫一新纪录科（扁形动物门，单肠目，盲扁虫科）背睾涡虫属一新种

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摘 要 记述了中国涡虫单肠目1新纪录科背睾涡虫属1新种,即中国背睾涡虫 *Phaenocora sinensis* sp. nov.。新种的主要鉴别特征是:外轮廓呈长子弹形,后缘呈刀切状;精巢长度占体长的2/3,位于卵黄腺的背部。阴茎表面小刺呈犬牙状,其内折部中段具4个矩形的粗刺。子宫有2个开口,一端连接卵巢,另一端连接生殖腔。卵黄腺呈条形,具短分支,左右卵黄腺无衔接。生活于淡水。标本保存在深圳大学生命科学学院形态学研究室。

关键词 扁形动物门,单肠目,盲扁虫科,背睾涡虫属,新种。

中图分类号 Q959.113.1

单肠目涡虫在全球的淡水、半海水和海水中分布广泛,迄今已发现千余种,划分为6个亚目,即达氏亚目 *Dalyellioida*、*Endoaxonemata*、冠吻亚目 *Kalyptorhynchia*,盲扁虫亚目 *Typhloplanoida*、切头亚目 *Temnocephalida* 和 *Revertospermata*。近几年单肠目新属新种不断被发现 (Brusa, Damborenea and Noreña, 2003; Noreña, Damborenea and Escobedo, 2006; Willems, Artois, Vermin, *et al.*, 2004; Artois, Willems, Roeck, *et al.*, 2004; Willems, Artois, Jocqué, *et al.*, 2007; Damborenea, Brusa, Noreña, 2005; Brusa, Damborenea and Noreña, 2008), 中国上世纪仅记录单肠目2新纪录种 (Tu, 1934; 刘德增, 1993; 汪安泰, 吴海龙, 2005a), 本世纪作者报道了9种单肠目涡虫,其中新种8种,隶属于2科4属,均分布于淡水 (汪安泰, 李慧, 2005; 汪安泰, 2004; 汪安泰, 邓利, 2006; 汪安泰, 吴海龙, 2005a; 汪安泰, 吴海龙, 2005b; 易艳琼, 梁羽, 汪安泰, 2006; 汪安泰, 吴海龙, 2008)。盲扁虫亚目涡虫在中国迄今未见报道。作者于2009年在深圳的铁岗水库首次发现该亚目标本,经比较与鉴定,确定为盲扁虫亚目 *Typhloplanoida* (Bresslau, 1928~1933) 盲扁虫科 *Typhloplanidae* (Graff, 1905) 背睾涡虫属 *Phaenocora* (Ehrenberg, 1837; Luther, 1963; Ax, 2008) 1新种。

单肠目盲扁虫亚目涡虫现分9科,盲扁虫科下属11亚科,背睾亚科 *Phaenocorinae* 仅有2属,绝大多数分布于淡水。另1个属仅记录1种。

科征 涡虫雌雄同体,内具1个卵巢和1对精

巢;两性共用1个生殖孔通往体外。具有典型或可变形的莲座状的咽。淡水、海水和潮湿陆地均有分布。

属征 口位于身体的前部,咽呈桶状,斜向前下方伸出。精巢位于卵黄腺的背上方,多数有明显的分支,分支之间互相连接。卵黄腺具许多延长的分支,有的分支延伸至精巢背部。生殖孔位于体腹面的中前部,射精管在非交配时,像衣袖样内翻,表面附有明显的角质尖刺。生殖器官有管道与肠道连接。生殖腔呈梨形。虫体表皮无杆状体,具伪杆状体束。原肾管有独立的开口。

1 材料与方法

采集标本用13号水生生物网在水草之间来回拉网,孔径为10 mm粗网滤除粗渣,沉淀5 min后倒除上层水,取沉渣在解剖镜下分离涡虫。制作整装片标本:把虫体置于载玻片,加盖玻片,在盖玻片一侧滴Bouin氏液,另一侧用滤纸吸出,静置1.5 h后移入新鲜固定液6 h。70%乙醇和高纯水交替清洗4 d, Mayer氏苏木精浸染1.5 h, 0.5%盐酸分色,新鲜自来水浸泡2 min。乙醇逐级脱水,二甲苯透明,树脂封片。切片标本厚6 μm ,苏木精单染。所有标本于Olympus BX51显微镜下观察, Olympus DP72数码相机拍照,并用其软件分别进行测量。

2 新种描述

中国背睾涡虫,新种 *Phaenocora sinensis* sp. nov.
(图1~9)

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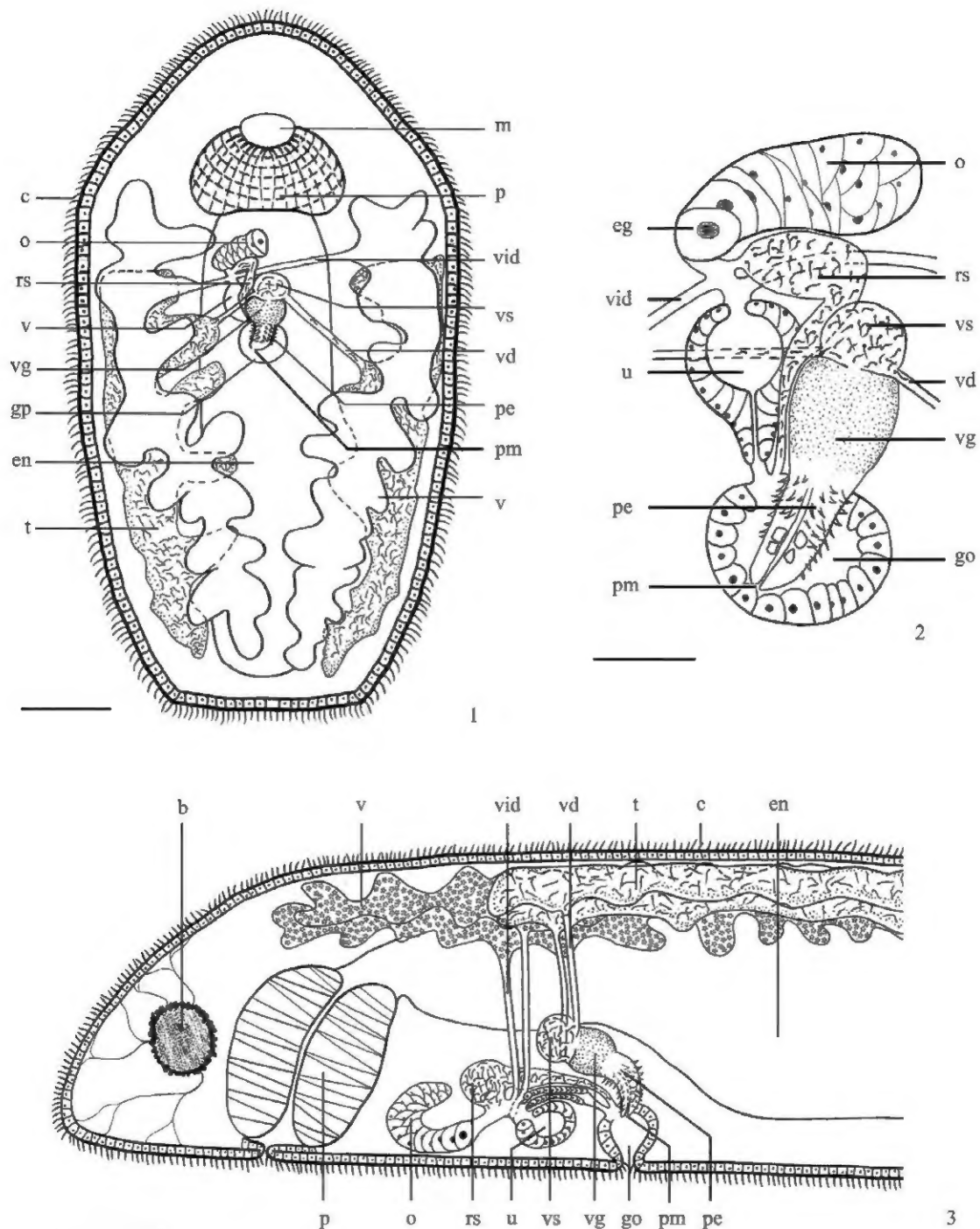


图1~3 中国背睾涡虫, 新种 *Phaenocora sinensis* sp. nov.

1. 整体形态腹面观 (whole body, ventral view) 2. 交配器官 (copulatory apparatus) 3. 前段形态侧面观 (forepart, lateral view) b: 脑 (brain) bc: 交配囊 (bursa copulatrix) c: 纤毛 (cilia) en: 肠 (enteron) eg: 卵 (egg) go: 生殖孔 (gonopore) m: 口 (mouth) o: 卵巢 (ovary) ov: 输卵管 (oviduct) p: 咽 (pharynx) pe: 阴茎 (penis) pm: 阴茎口 (penis mouth) s: 尖刺 (spines) ss: 粗刺 (stout spines) t: 精巢 (testis) u: 子宫 (uterus) v: 卵黄腺 (vitellaria) vd: 输精管 (vas deferens) vg: 颗粒囊 (vesicula granulorum) vs: 储精囊 (vesicula seminalis) rs: 受精囊 (receptaculum seminalis) 比例尺 (scale bars): 1 = 200 μm , 2 = 40 μm , 3 = 100 μm

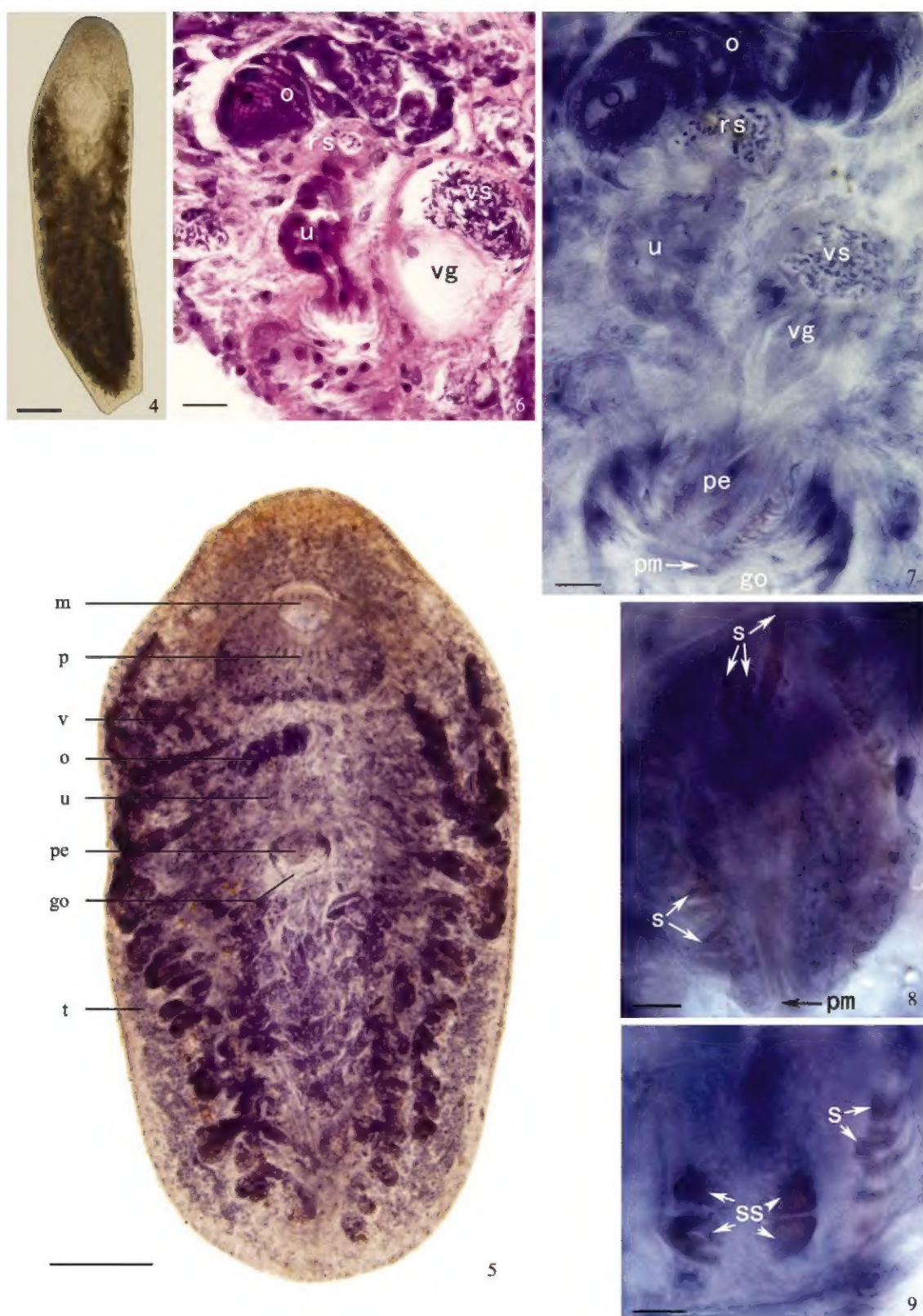


图4~9 中国背睾涡虫，新种 *Phaenocora sinensis* sp. nov.

4. 生活照片 (photographed in life) 5. 整装片 (whole specimen) 6. 生殖器官切片 (copulatory apparatus horizontal slice) 7. 生殖器官 (copulatory apparatus) 8. 阴茎 (penis) 9. 阴茎刺 (penis thorn) 比例尺 (scale bars): 4, 5 = 200 μm , 6, 7 = 25 μm , 8 = 10 μm , 9 = 5 μm

2.1 模式标本

正模 1, SZ200903-I-1, 汪安泰, 2009-03-20, 采自广东省深圳市宝安区铁岗水库 (22° 38' N, 113° 54' E) 的水生植物上; 副模 3, SZ200903-I-2 ~4, 时间与地点同正模。所有标本保存在深圳大学生命科学院形态学研究室。

2.2 形态特征

外部特征 生活成熟个体长 1 670 ~ 1 700 μm , 体中段宽 410 ~ 440 μm , 其轮廓静止时呈子弹形, 后缘刀切状; 运动时体细长, 身体上下扁平。对显微镜光源较敏感, 光照后运动迅速。咽至头前端呈橘红色, 体表无色素细胞, 较透明, 咽后体表呈灰色, 咽位于身体前 1/4 处, 前窄后宽, 呈酒桶型, 可变形, 捕食伸出时如开花般斜向前伸, 咽长 290 ~ 300 μm , 宽 263 ~ 273 μm 。头部无眼点。表皮厚度 6.0 ~ 7.0 μm , 多数区域为 6.5 μm 。腹面纤毛长 5.0 ~ 5.5 μm 。无明显的刚性感觉毛。表皮无杆状体, 有伪杆状体束。

生殖器官特征 雌雄同体, 具 1 个生殖孔, 位于体中段偏前的腹侧, 精巢 2 个, 长条形, 具多分枝, 分别位于左右卵黄腺上方的体侧背部。精巢从咽后侧一直延伸至尾部, 长 1 190 μm , 宽 130 μm , 占体长的 4/5。左右精巢在其前 1/3 处各有 1 根输精管, 分别与储精囊基部的左右侧连接。储精囊位于体前中部的消化道腹侧, 呈圆球状。紧贴储精囊后侧的颗粒囊, 颗粒囊后方的阴茎呈膝状, 基部直径 23 μm , 端部直径 10 μm 。朝后下方延伸到生殖孔。非交配时, 阴茎内翻, 阴茎表面密布犬牙状小刺 (长 4 μm), 阴茎内翻部分中部表面具 4 根较宽扁平的粗刺 (4 ~ 5 μm × 4 ~ 6 μm)。阴茎端部, 即内翻的顶端有 3 ~ 5 根细长的尖刺 (7 μm)。卵巢 1 个, 位于咽后的腹面, 储精囊的前方, 呈长肾状。输卵管不明显, 其长度与成熟卵胚直径相近。受精囊位于储精囊与卵巢之间, 呈不规则长条形。受精囊一端开口于输卵管, 另一端有 1 个管道向后延伸至生殖腔。卵黄腺 2 条 (长 1 350 μm), 位于体 2 侧的精巢腹面, 呈多分支的长条形, 前至咽侧, 后至尾部, 左右卵黄腺无衔接。卵黄腺在虫体的前 1/4 处, 各有 1 根卵黄管汇入输卵管中部。输卵管后连接子宫, 子宫壁由单层柱状上皮构成, 子宫的另 1 端有管道通往生殖腔, 即子宫的前后端各有 1 个开口。生殖腔外围有密集的腺细胞。

词源: 新种种名以中国国名命名。

3 分类讨论

背睾涡虫属已记录 31 种 (Ax, 2008;

Beklemishev, 1920; Brinkmann, 1905; Gilbert, 1938; Graff, 1913; Hyman, 1951; Hyman, 1955; Beklemishev, 1929; Karling, 1956; Kolasa, 1973; Luther, 1963; Marcus, 1946; Ruebush, 1939; Steinbock, 1966; Young & Harris, 1973; Young, 1976), 经核对, 与中国背睾涡虫新种性状相近的物种有 *Phaenocora kepneri* (Gilbert, 1935) 与 *P. subsalina* (Luther, 1921; Luther, 1963)。

Phaenocora subsalina 分布于芬兰与德国的海水和半海水中, 整体外形同新种涡虫, 但 *P. subsalina* 精巢位于身体的前部, 全长不及体长的 1/4, 输卵管长与卵巢长度相当, 子宫只有 1 个开口; 新种生活于淡水, 精巢长度占体长的 4/5, 子宫有 2 个开口, 一端连接卵巢, 另一端连接生殖腔, 其鉴别特征与 *P. subsalina* 有显著区别。

Phaenocora kepneri (Gilbert, 1935) 分布于美国东部特拉华州的淡水水域, 虫体外轮廓呈长椭圆型, 尾端弧形, 其精巢和卵黄腺大小与新种相似, 卵黄腺呈指状分支, 左右卵黄腺在体中轴呈网状衔接, 阴茎表面的小刺性状和大小无明显区别。新种外轮廓呈长子弹形, 后缘呈刀切状; 卵黄腺呈条形, 具短分支, 左右无衔接现象, 阴茎表面小刺呈犬牙状, 其内折部中段具 4 个矩形刺, 呈蝶状排列, 远端有较长的刺 (图 8, 9)。其鉴别特征与 *P. kepneri* 有显著区别。

4 栖息地

深圳市郊的铁岗水库库区采集地海拔 20 m, 水深 20 ~ 60 cm, 水温 25 $^{\circ}\text{C}$, pH 6.8。水底有许多沉水草本植物丛生, 岸边有一片白桦林, 是一个封闭的饮用水源, 上游的生活污水经污水处理站和湿地处理后流入水库。用 13 号水生生物网在水草丛间扫网, 水草间有小鱼、小虾、枝角类、桡足类、轮虫、螺等多种水生动物。在附近 1 条入库的水沟 (宽 3 m) 内, 水色暗灰, 取水面漂浮的水葫芦水洗, 亦发现该物种。在模式标本采集前, 曾一次采集到该物种 20 余只。实验室繁殖未成功, 其原因有待探索。

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A NEW SPECIES REPRESENTING THE FIRST RECORD OF THE FAMILY TYPHLOPLANIDAE FROM CHINA (PLATYHELMINTHES, RHABDOCOELA)

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Abstract In this paper, a new species of the family Typhloplanidae is described and figured. Type specimens are deposited in College of Life Sciences, Shenzhen University.

***Phaenocora sinensis* sp. nov.** (Figs 1–9)

Holotype 1, SZ200903-I-1, Wangantai, found on aquatic plant in a reservoir located in Baoan district, Shenzhen, Guangdong Province, China (22° 38'N, 113° 54'E) in Mar. 2009. Paratypes 3, SZ200903-I-2–4, from the same location as holotype. All of the specimens are deposited in the Morphological Research Laboratory of Life Science College, Shenzhen University, Guangdong Province, China.

Description. Body length ranges from 1 670 to 1 700 μm , width 410 to 440 μm . Body shape is bullet-shaped, oblate and knife-like posterior part. Pharynx to the front of head is orange and no pigments in body surface, the whole body is transparent. The pharynx is in the 1/4 front of the whole body, no eyes. Hermaphroditism, with a gonopore, is at the middle of the ventral side. A pair of testis locating at the back of vitellarium is long-shaped. Testis extends from the pharynx posterior to the end of body, which is 4/5 length of whole body. The penis is inward folding and has spines on the surface which like canines, 4 μm . 4

stout spines are at the internal surface of penis, 4 – 5 $\mu\text{m} \times 4 - 6 \mu\text{m}$.

Habitat. The new species was found on aquatic plant in a reservoir located in Baoan district, Shenzhen, Guangdong Province, China. 20 m above sea level, temperature 25 °C and pH 6.8. The underwater plants grew in wanton profusion and the reservoir is a closed source of drinking water. Upstream of the sewage flow into reservoir was treated by Sewage treatment plant and wetlands.

Etymology. The new species was named as the country of China.

Remarks. Compared with all recorded species of genus *Phaenocora*, the present species characterizes that testis locating at the back of vitellarium which is 4/5 length of whole body. Uterus has two openings, one ending at ovary, the other at genital cavity. Vitellariums are long-shaped with short branches. The surface of the penis has small spines which like canines. The four triangle stout spines at the internal folded surface of penis are butterfly-shaped distribution. These results distinctly differs from that of other two similar species originated from *P. subsalina* (testis is shorter than 1/4 length of whole body) and *P. kepleri* (Vitellariums netlike).

Key words Platyhelminthes, Rhabdocoela, Typhloplanidae, *Phaenocora*, new species.

更正

《动物分类学报》2010年35卷第4期论文：刘洪涛，汪安泰，中国广东水媳属一新种（水媳纲，无鞘媳目，水媳科），859页图注中的比例尺（scale bars）：11 ~ 12 = 1 000 μm ，15 = 300 μm ，更正为比例尺（scale bars）：11 ~ 12 = 1 000 μm ，15 = 300 μm 。